

Earth's Hydrosphere

ES-5 The student will demonstrate an understanding of Earth's freshwater and ocean systems.

ES-5.8 Analyze environments to determine possible sources of water pollution (including industrial waste, agriculture, domestic waste, and transportation devices).

Taxonomy level: 4.-B Analyze Conceptual Knowledge

Previous/future knowledge: Students in 5th grade explained how mixing and dissolving of foreign materials is related to water pollution. In 7th grade students explained the implications of depleting and the importance of conserving resources, such as water. In Earth Science this foundation will be deepened as specific sources of water pollution in the environment are analyzed.

It is essential for students to know that water is an essential resource on Earth. Organisms on Earth depend on water for life. Humans depend on water in many ways. Water pollution is an area where humans have an impact on water supplies.

Surface water pollution can be grouped into two main types: point sources and nonpoint sources.

Point sources Point source pollution is generated from a single point of origin. When analyzing an environment for water pollution sources, students may find the source to be a sewage treatment plant for domestic waste, or an industrial site. Improper bacteria and viruses that result from disposal of sewage, or toxic wastes that enter streams can send this pollution downstream into the environments.

Nonpoint sources Nonpoint sources of pollution generate pollution from widely spread areas. Rainwater absorbs air pollutants and may become acidic, bringing down precipitation far from its origin. Rainwater may also drain fertilizers and pesticides from agricultural sites, or wash oil, gasoline, and other chemicals from roads and parking lots. Nonpoint sources are not as easily identified nor as easily cleaned up as point sources.

Groundwater pollution - Not only is surface runoff water a carrier of pollutants, pollution can find its way into groundwater and into the ocean.

Groundwater pollution Some water filled with chemicals, road salt, fertilizer, sewage or other pollutants may find its way into groundwater and aquifers in a region. Once groundwater is contaminated, the pollutants can be very difficult to remove.

Ocean pollution Pollution of ocean water is also a concern. Near-shore regions and estuaries are often the first regions of the ocean to become polluted. Sewage water is the most common source.

In analyzing the sources of water pollution, students need to realize the importance of clean-up efforts and the importance of reducing water pollution. When there is not enough water to go around, water conservation is most important.

It is not essential for students to actually collect water pollution samples for analysis.

Assessment Guidelines:

The objective of this indicator is to *analyze* environments for sources of water pollution; therefore, the primary focus of assessment should be to carefully study environments to determine how the information could identify pollution sources.

In addition to analyze appropriate assessments may require students to:

- *exemplify* the various sources of water pollution;
- *compare* point and nonpoint pollution; or
- *infer* a pollution source from its description.